Consumer Demand for Source Verification Labels

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Executive Summary

In order to assess consumer demand for source verification labels, a consumer survey was mailed to 5000 households in the continental United States during the spring of 2003. The survey was re-sent during the early summer to those households that did not answer in a second mailing. The survey was designed to assess consumers' perceptions of a mandatory country-of-origin labeling (COOL) program, to determine the value of COOL of beef versus pork and poultry products to respondents, and to analyze the relative importance of COOL to other beef attributes that may be of value: price, traceability, food safety, and tenderness. Additionally, the survey solicited information regarding respondents' purchasing behavior and attitudes about beef products, beef qualities that consumers find most desirable, food safety attitudes, the agency believed to be most suitable for certifying the origin of meat products, and the fairest mechanism to pay for costs that may arise from a mandatory COOL program.

Consumer response toward a proposed COOL program applied to all meat products, and specifically to ribeye steak, chicken breast, and pork chops was analyzed. Note that in this particular application, the COOL labeling program proposed to consumers certifies meat products as being born and raised in the United States ("Certified U.S."). Results indicate consumers are willing to pay an average of $389.47 per household annually in order to obtain a COOL program for all types of meat products. Consumers are willing to pay premiums of 26.5%, 30.6%, and 42% of the original market price for steak, pork chops and chicken breast, respectively, to obtain "Certified U.S."-labeled meat. Our results also indicate that consumer preferences for country-of-origin labeled chicken products, which are not currently included in the mandatory COOL program, differ from consumer preferences for "Certified U.S."-labeled beef and pork.

In addition to the willingness-to-pay questions, choice questions were developed to determine the relative value of country-of-origin (generic, without the association with any country in particular), food safety, traceability (source verification) and quality of beef to consumers. A choice set experimental design was used and analyzed to provide further information about the relative importance of country-of-origin labeling. From the choice experiment we conclude that when COOL is not associated with a particular origin, and it is simply presented as a designation of origin, without carrying any particular connotation, or reputation for a certain quality, consumers' WTP for such an attribute in ribeye steak is fairly low, being $0.56/pound. On the other hand, labels that denote that the steak has been food safety inspected carry premiums about $3.89/pound, labels denoting the meat can be traced to the farm-of-origin carry premiums of $1.03/pound, and labels certifying that the meat is tender carry premiums of $1.13/pound. Thus, out of the attributes considered, COOL is valued the least. These relatively lower consumers' WTP estimates for country-of-origin labeling versus food safety inspection, traceability, and tenderness, may revive the debate of whether or not a policy that provides such information will pass a benefit- cost analysis.

Other conclusions drawn from the survey responses indicate that food safety inspection, freshness, and high quality grade are the three attributes consumers ranked the highest among 15 meat characteristics. Additionally, respondents indicated that meat produced domestically is the safest of all major importing countries, followed by meat produced in Canada. The majority of the survey respondents believed the extra costs associated with the COOL program should be paid for with existing government budgets while reducing expenditures on other programs or infrastructures, or should be paid via higher meat prices that could be used to compensate industry expenditures. Additionally, 60% of the consumers indicated that they preferred the government (USDA-AMS inspection services) to certify the origin of meat products.

Overall, the COOL survey results suggest that consumers are willing to support a mandatory COOL labeling program, that they perceive domestic beef to be very safe, and have a high-level of confidence in U.S. government agencies as potential certifiers. However, when COOL is compared to other attributes such as food safety inspection, traceability and tenderness, COOL is valued the least. Therefore, while COOL may be important in isolation of other attributes, the relative importance declines as other attributes are introduced in the choice set. It appears that a system that would assist in the traceback of meat throughout the food system would be more valued than country-of-origin labeling.

Section 1. Study Overview, Data, Survey Methods

1.1. Introduction

Food safety scares, threats of bioterrorism, and increasing per capita income have all played a role in the escalating demand for source-verification of food. Source verification labeling has been seen as a mean to increase consumer confidence in food products such as beef, pork and poultry. Smith et al. (2000) defines source verification or traceability as the ability to identify the origin of animals or meat as far back in the production sequence as necessary to ascertain ownership, identify parentage, assure safety and determine compliance in "branded beef" programs.

Labeling programs have been shown to have important implications in consumer demand. The purpose of this project was to draw conclusions about whether or not source verification labels decrease the risk perception associated with specific meat products, increasing the potential premium for products carrying source verification labels. In addition, the project was designed to provide insight on the kinds of information that consumers value from food labels, and the relative importance of source verification labels versus other food attributes. Additional research questions included: Is there a market segment willing to pay a premium for source-verified beef? What role do the socio-demographic characteristics play on this market segmentation? Also, if a premium exists for source-verified beef, what factors affect premiums? Do U.S. consumers consider domestic and local beef to be safer or less risky than imported beef? Thus, the overall objective of this study was to measure the consumer's response to source verification beef labels.

1.2. Survey Methods, Data and Respondent Demographics

During spring of 2003, data were gathered using a mail survey sent to households in the continental United States. A representative sample of 5000 participant households was drawn from a mail listing purchased from Survey Sampling, Inc., a leader in the science of sampling methodology and research quality. This listing is compiled from the white page directories, and supplemented with a variety of other sources such as Department of Motor Vehicles information, voter information, and census data. Thus, the listing is expected to be representative of the current U.S. Census. Before the survey was mailed, a pretest was conducted using consumers in two different U.S. cities. After using the information gathered in the pre-test to make slight modifications, the final survey was sent out in a seven-page, booklet format, with a cover letter explaining the project, and a postage-paid return envelope. A second survey was mailed out to the households who did not respond in the first attempt.

The survey solicited information regarding respondents' purchasing behavior and attitudes about beef products, beef qualities that consumers find most desirable, food safety attitudes, whether or not they would be willing to pay a certain amount per year to support a general mandatory COOL labeling program, and whether they would pay a given premium for beef steak, chicken breast and pork chops labeled as "Certified U.S." Additionally, consumers were asked to indicate the agency they believed would be most suitable for certifying the origin

of meat products, and the fairest mechanism to pay for costs that may arise from a mandatory COOL program. Moreover, choice questions were developed to determine the relative importance of price, country-of-origin, food safety, traceability (source verification) and quality of beef to consumers. Finally, socio-demographic characteristics were elicited in the last section of the survey.

From the 5000 surveys mailed, 216 were returned because of insufficient information in the address and 631 were returned completed and were analyzed, which contributes to a response rate of about 13%. The majority of respondents were the primary food shoppers of the household (85%), Caucasian (91%), and female (54%). The respondents' average age was about 55 years, and 35% of all respondents had children under the age of 18 years old living in their household. The mean household income of the sample was calculated to be about $50,000 for the 2002 calendar year, and their average education included a junior college degree. Summary statistics and variable descriptions are presented in Table 1. Our sample is comparable to the United States Census (U.S. Census 2000) in terms of gender, education, number of children per household and household size. However, this sample includes fewer minorities, which is a feature common to many other surveys.

As in all surveys, sample representativeness is always of concern to the researcher. Mitchell and Carson (1989) discuss four types of sample design and execution biases: population choice bias, sampling frame bias, sample nonresponse bias, and sample selection bias. Our sample was slightly upscale compared with the general population. The effect of sample selection on our results concerning country-of-origin labels is indeterminate. The slightly more upscale sample may be more receptive to country-of-origin labeled products, but may also have a stronger preference for more expensive products. There could also be some degree of sample selection bias, in which the respondents who were more interested in the COOL program elected to participate in the survey. Given the preceding observations, we acknowledge that results may not be fully generalizable to broader samples. Taking into account potential biases, the data obtained from the 631 completed surveys is used to address the objectives stated above in the following sections of this report.

The next two sections of this report address the primary objectives of the research project. Section two of this report focuses on consumers' perceptions and willingness-to-pay (WTP) for the country-of-origin labeling program. It includes a discussion of previous research on source-verification labeling, and presents the results of the dichotomous choice questions regarding preferences and WTP for a mandatory country-of-origin labeling (COOL) program and WTP for COOL of beef, pork and chicken. Section three addresses the relative importance of farm-level-source verification, country of origin, price, food safety inspection and beef quality.,

Section 2. Assessing Consumer Preferences for Country-of-Origin Labeled Products

2.1. Overview of the Mandatory Country-of-Origin Labeling Program in the U.S.

The 2002 Farm Security and Rural Investment Act contains a provision mandating retailers to provide consumers with country-of-origin labeling (COOL) information for ground and whole muscle cuts of beef, pork and lamb by September 30, 2004. Seafood, peanuts and fruits and vegetables are also included in the mandatory COOL law. According to the COOL program guidelines created by the United States Department of Agriculture Agricultural Marketing Service (USDA-AMS, 2002), the government agency responsible for implementing COOL, only meat products from animals born, raised and processed in the United States may be labeled as a "Product of the U.S.A." Imported products produced entirely in any country other than the United States would be labeled as a "Product of Country X (USDA-AMS, 2002a)."

The COOL provision has become one of most polemic labeling programs. The law was proposed on the premise that country of origin labeling would increase demand for U.S. meat products. However, in order for producers to benefit from an increase in demand, the same quantity of U.S. meat products would have to a) sell at a higher price in the market, b) a larger quantity of U.S. beef would have to sell at the same price, or c) a combination of both increased price and increased quantity. Thus, to determine if COOL would increase demand for U.S. products, one should consider whether U.S. consumers would be willing to pay a premium for U.S. products and how this premium compares to the associated costs.

While proponents of a mandatory labeling policy argue that the costs associated with this labeling policy are minimal (Becker), opponents indicate that a label is an unnecessary trade barrier, or that it is too difficult and expensive to implement. The USDA-AMS estimated COOL would cost $2 billion in the first year to develop the required record keeping system. A more comprehensive cost study by Anderson and Kay found mandatory COOL would cost the beef industry an additional $0.10 per pound and the pork and seafood industries an additional $0.075 per pound. Based on these findings, the beef industry would be at a competitive cost disadvantage to the pork industry, due in part to the higher level of integration in the pork industry (Anderson and Kay, 2003).

In spite of the continuing COOL debate, and the fact that the new Farm Bill mandates country-of-origin labels on all perishable products, very little research has been conducted to assess the economic impact of country-of-origin labels. The impact of COOL on the affected sectors of livestock industry is still uncertain. Given the currently unanswered questions surrounding country-of-origin labeling for beef and other perishable products, the objectives of this section are twofold: (1) to determine consumers' preferences for country-of-origin labels on different types of meat, and (2) to calculate the market premium (if it exists) for U.S. labeled meat, including beef, chicken and pork. Additional sub-objectives are to establish consumers' food safety perceptions associated with meat products originating from alternative countries; to determine the entity most trusted by U.S. consumers for origin certification, and to find the payment method consumers believe to be fairest for covering costs associated with a mandatory COOL labeling program.

2.2. Review of the Recent Labeling Literature

In many countries, local products carry a certain reputation for quality. Quagrainie, Unterschultz and Veeman (1998) compared a popular beef product from Alberta with a similar product produced elsewhere in Canada. They found the price of the non-Alberta meat product had to be reduced by 15% so that consumers would be indifferent between the two sources. Loureiro and McCluskey (2000) found that Spanish consumers were willing to pay a premium for fresh meat products labeled with a Protected Geographical Identification (PGI) label, "Galician Veal," which is regulated by the European Union. While consumers were willing to pay a premium for the beef with a "Galician Veal" label, the premium varied depending upon the cut and quality of beef. Consumers in France, Germany, and the United Kingdom were surveyed in 2000 by Roosen, Lusk and Fox to determine European consumers' preferences for beef labeling strategies associated with origin-labeling, private brands, and mandatory labeling of beef from cattle fed genetically modified corn. Consumers in France and Germany indicated that the origin of their beef was more important than any other product attributes such as brand, price, marbling, or fat content. In the UK, however, consumers ranked origin labeling as more important than brand labeling, but steak color, price and fat content were most important (Roosen, Lusk and Fox, 2003).

In the U.S., Umberger et al. (2002) found in blind taste tests, consumers could taste and were willing to pay a significant premium of $0.70 per pound (on average) for corn-fed beef raised in the U.S. versus grass-fed beef raised in, and imported from Argentina. However, a portion (23%) of the consumers preferred and was willing to pay a $1.36 per pound premium for the Argentine, grass-fed beef. While these studies indicate consumers are willing to pay a premium for geographically-labeled products, they are likely not representative of U.S. consumers' preferences.

Few studies have examined consumers' perceptions associated with country-of-origin labels on beef products in the United States. Schupp and Gillespie (2001a) sampled beef processors, retailers and restaurants in Louisiana to identify why these beef-handling firms would either support or reject a mandatory country-of-origin labeling policy. They found supporters of the law believed their consumers would find the label valuable, while opponents of the law thought that mandatory labeling simply meant more government intervention. In another study Schupp and Gillespie (2001b) surveyed Louisiana households to analyze consumers' degree of support for mandatory country-of-origin labeling of beef in grocery stores and restaurants. Over eighty-percent of their respondents supported a compulsory labeling program. While these studies show beef handlers' and consumers' support of mandatory labeling, they do not shed light on whether or not consumers would be willing to pay the additional costs associated with the mandatory labeling policy.

In a sample of Colorado consumers, Loureiro and Umberger (2003) estimated the mean willingness-to-pay (WTP) for a U.S. mandatory labeling program, as well as for "U.S. certified" steak and hamburger, concluding consumers are willing to pay larger premiums to obtain "U.S. certified" beef. In a recent study, Umberger et al. (2003) used experimental methods to

determine Chicago and Denver consumers' preferences for steak after visually evaluated and bidding on two steaks, which differed only in package labels. One steak was labeled as "Guaranteed U.S.A.: Born and Raised in the U.S.," and the other steak was unlabeled. Seventy-five percent of the 273 consumers indicated they would prefer to have their meat labeled with the country of origin, however only 69% of the consumers were willing to pay an average premium of 19% for the U.S. labeled steak (Umberger et al., 2003).

The current research addresses pending questions regarding U.S. consumers' preferences and willingness-to-pay for country-of-origin labeling of meat products, extending both the context and geographical dimensions of the studies conducted by Schupp and Gillespie (2001a, 2001b), and by Loureiro and Umberger (2003) and Umberger et al. (2003). This research will analyze and compare consumer's WTP for different types of meat products. Additional quantitative information regarding safety perceptions surrounding domestic and imported meat products, as well as trust levels in surveillance authorities is presented.

2.3. WTP Methods and Estimation

In order to elicit consumers' willingness-to-pay (WTP) through the mail survey, we implemented a set of dichotomous choice questions (DC). In particular, participants were first presented with a question related to WTP for a general country-of-origin labeling program to be applied to all meat products, and later on, consumers were asked specifically their WTP for different types of meat products. The following valuation question was used to assess the WTP for the labeling program:

> *Suppose that you were asked to give your opinion regarding a "country-of-origin" labeling program in the United States. If implementation of this mandatory country-of-origin labeling program for meat would cost your household $[bid]/year. What would your position be with respect to this mandatory labeling program?*
>
> a. *In favor of a mandatory program*
> b. *Against a mandatory labeling program.*

In the first question the random bid assigned to consumers ranged from $10/year up to $250/year. The bid design procedure followed similar studies recently conducted in the area of consumer response to food labeling, as well as a survey pre-test.

The next questions in the survey elicited consumer WTP for "U.S. certified" ribeye steaks, chicken breasts and pork chops. In the questionnaire design, the national average prices published by the USDA (USDA/ERS) were used as reference or baseline prices. These baseline prices indicate the average price for non-labeled COOL meat products. Each consumer faced three valuation questions of the following form:

> *Now assume that the "cost of traceability required to label a ribeye beef steak as "Certified U.S. Beef" is $[price]/lb. in addition to the traditional $6.75/lb. price, would you be willing to pay this premium in order to guarantee that your beef is "Certified U.S. Beef"?*

a. Yes
b. No

Other consecutive and similar questions were asked for the valuation of chicken breast, and pork chops. In all three cases, the bid amounts were percent values in increments of 5% over the initial value of the product, adding up to a maximum premium of 75%.

Given that the individual responses to these last three survey questions may not be independent, we modeled the three responses in a panel format with a binary logit model, such that:

(2.1) $$\mathrm{WTP}_{ij}^{*} = \alpha + \beta \mathrm{Bid}_{ij} + \gamma \mathbf{Z}_{i} + \varepsilon_{ij}$$

where WTP_{ij}^{*} indicates the latent WTP of participant *i* for product *j*. α, β, and γ are the coefficients to be estimated, while the *Bid* variable represents the assigned premium for each of the country-of-origin labeled products that each consumer *i* faces, and the vector **Z** includes socio-demographic characteristics of each individual respondent. The error term $\varepsilon_{ij} \sim \mathrm{G}(0, \sigma^2)$ follows a standard logistic distribution denoted by $G(.)$, having mean zero and standard deviation $\sigma = \pi / \sqrt{3}$.

Equation (2.1) was estimated via maximum likelihood. The respective WTP estimates were calculated as Hanemann (1984) proposed, such that[1]:

(2.2) $$\mathrm{E(WTP)} = -\frac{1}{\hat{\beta}} \ln(1 + \exp^{\hat{\alpha}})$$

Notice that this formula employs the $\hat{\beta}$ coefficient associated with each of the respective bid amounts, and the $\hat{\alpha}$ coefficient represents here the so-called grand constant. The grand constant is the sum of the products of the estimated coefficients times their respective mean values (excluding the bid coefficient). This formula restricts the WTP values to a positive value. The *E(WTP)* estimates and 95% confidence intervals are presented in Table 4. The predicted standard deviations of the predicted E(WTP) were calculated using the formula presented in (2) and are in parenthesis below the estimates.

2.4. Empirical Specification of WTP for COOL

The following logit model was estimated to assess consumers' WTP for the three, country-of-origin labeled meat products:

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[1] Note that the formula $\mathrm{E(WTP)} = -\frac{\hat{\alpha}}{\hat{\beta}}$ could be potentially applied, and it would provide lower point estimates. This is because it does not restrict the estimates to the positive range. In our case, this is not a very realistic assumption, since it is most likely that consumers have a positive or zero WTP for COOL labeled products. In fact, it is not very plausible to assume that consumers may have a negative WTP for COOL labeled products, implying that they will buy them at a discount applied to the regular market price.

$$WTP_{ij}^{*} = \alpha_0 + \beta_1 BidChicken_{ij} + \beta_2 BidBeef_{ij} + \beta_3 BidPork_{ij} + \beta_4 Age_i + \beta_5 LowEdu_i + \beta_6 HighEdu_i + \beta_7 Children_i + \beta_8 LowInc_i + \beta_9 HighInc_i + \beta_{10} Gender_i + \varepsilon_{ij} \quad (2.3)$$

where $BidChicken_j$, $BidBeef_j$, and $BidPork_j$ represent respectively the random amount each respondent was asked to pay for a pound of country-of-origin labeled chicken breast, pork chops and beefsteak. The variables Age_i, $Gender_i$, and $Children_i$ represent the age of the respondent measured in years; the gender represented by an indicator variable that takes the value of 1 if the respondent is a female and 0 otherwise; and another indicator variable that takes the value of 1 if children younger than 18 years of age are living in the household. In order to allow for non-linear relationships between the dependent and independent variables, the variables *Income* and *Education* where introduced as a series of indicator variables that represent the lowest and highest values of the variables. In particular, the variable $LowEdu_i$ represents respondents whose education level is below or includes high school, while $HighEdu_i$ represents respondents whose education level is more than a 4-year University degree. Additionally, $LowInc_i$ represents individuals with a household income after taxes in 2002 lower than $30,000, while the variable $HighInc_i$ indicates individuals with household income higher than $50,000 for the same period. Finally ε_{ij} is the error term that follows a logistic distribution. The same specification form was used to estimate the mean WTP for the labeling program applied to all meat products, although in this particular case a single binary logit model was used, specified as a function of the same socio-demographic characteristics and the random bid associated with the labeling program.

Further, in order to test the role of the different socio-demographic characteristics on consumer response for the three labeled products, an extended version of equation (3) was estimated, including the cross-products of the socio-demographic characteristics with the indicator variables that denote each of the three meat types (beef, pork and chicken, respectively). The estimated extended model has the following functional representation:

$$\begin{aligned} WTP_{ij}^{*} = {} & \alpha_0 + \beta_1 BidChicken_{ij} + \beta_2 BidBeef_{ij} + \beta_3 BidPork_{ij} + \beta_4 Age_i * Chicken + \\ & \beta_5 Age_i * Beef + \beta_6 Age * Pork + \beta_7 LowEdu_i * Chicken + \beta_8 LowEdu_i * Beef + \\ & \beta_9 LowEdu_i * Pork + \beta_{10} HighEdu_i * Chicken + \beta_{11} HighEdu_i * Beef + \beta_{12} HighEdu * Pork + \\ & \beta_{13} Children_i * Chicken + \beta_{14} Children_i * Beef + \beta_{15} Children_i * Pork + \beta_{16} LowInc_i * Chicken + \\ & \beta_{17} LowInc_i * Beef + \beta_{18} LowInc_i * Pork + \beta_{19} HighInc_i * Chicken + \beta_{20} HighInc * Beef + \\ & \beta_{21} HighInc_i * Pork + \beta_{22} Gender_i * Chicken + \beta_{23} Gender_i * Beef + \beta_{24} Gender_i * Pork + \varepsilon_{ij} \end{aligned} \quad (2.4)$$

where the indicator variables chicken, beef and pork represent each of the meat types. The rest of the socio-demographic characteristics match the description given above.

2.5. COOL Program and Product Certification Results

2.5.1. Important Attributes to Consumers When Purchasing Meat

Respondents were asked to indicate the importance of 15 attributes that people may look for when purchasing meat. Table 2 shows that food safety inspection, freshness, and high quality grade are the three attributes that rank the highest on a five-point Likert scale and were ranked as "extremely desirable" to "very desirable". Other attributes such as price, U.S. origin, leanness, tenderness, and nutritional content were also ranked rank as "very desirable" on average. These results are similar to other studies conducted with smaller samples (see Loureiro and Umberger, 2003, and Umberger et al., 2003). It is interesting to note that brands, meat produced or raised locally, and organic production methods were the attributes with the 3 lowest rankings.

2.5.2 Perceived Safety of Meat Products from the United States versus Major Importers

Respondents used a five-point scale (5 = extremely safe; 1 = not at all safe) to rate the safety of meat originating from the United States and six major meat or livestock importers: Argentina, Australia, Canada, Denmark, Mexico, and New Zealand. In terms of food safety perceptions associated with the country-of-origin of meat products, respondents indicated (as shown in Table 3) that meat produced domestically is perceived to be the safest, followed by meat produced in Canada. However, consumers rated meat from Mexico and Argentina as the least safe meats, below meat from Australia, New Zealand, and meat originating from Denmark, a country that has suffered outbreaks of BSE.

2.5.3. Most Suitable Agency for Certifying the Origin of Meat

Respondents were asked to indicate the agency they believed would be most suitable to certify the origin of meat. Approximately 60% of the consumers indicated that they prefer the government (USDA-AMS inspection services) to certify the origin of their meat products. This high percentage reflects strong confidence of U.S. consumers in the inspection services of the U.S. government. Other groups preferred as the best certification agencies were third party independent certifiers with 20.8% of the support, and local producers with 12.7% of support. Only 7.9% of the participants indicated other different agencies would provide the most desirable way of certification.

2.5.4. Fairest Mechanism to Pay for Costs of Mandatory COOL

Finally, respondents were asked to indicate the method they believed to be "the fairest way to pay for the costs that may arise from a mandatory COOL labeling program." Respondents showed a clear division of opinions. Nearly 39% of the respondents suggested that associated costs should be paid with the use of the existing government budget through reducing expenditures on other programs or infrastructures; however, 36.2% believed that the costs should

be paid via higher meat prices that could compensate industry expenditures. The other 10.9% of respondents believed the associated costs should be paid by fees applied to producers, and 2% preferred a higher income tax. The rest of the sample (about 12.2%) preferred to use another payment mechanism, most of them indicating that import levies and tariffs on imports would be the fairest mechanisms. Consequently only about a third of the sample favors consumers paying directly for the mandatory COOL labeling program.

2.5.5. Willingness-to-Pay for COOL

As mentioned previously, consumers were asked to indicate their WTP for a mandatory COOL program in the U.S. and for "Certified U.S." beef, pork and poultry products. The results of the estimation of equation (1) are presented in Table 4. In the equation that models the WTP for the individual COOL labeled products, the coefficients associated with the three random bids are negative and statistically significant. As in previous studies, which highlight that wealthier consumers are less likely to pay premiums for differentiated COOL products, the coefficient associated with levels of income above $50,000 is positive, although not statistically significant. The coefficient indicating the presence of children less than 18 years in the household (*Children*) carries a negative effect, and is statistically significant. Further, the variable indicating that the respondent has completed higher levels of education (*HighEdu*) is also negative and statistically significant. The variable *Age*, is also negative, although in this case not statistically significant. On the other hand, the variable that represents female respondents is the only one that is both positive and statistically significant. Overall, these results seem to indicate that wealthier and more educated consumers are not willing to pay premiums for COOL labeled products. This could prove a difficulty in order to garner niche markets for domestic meat producers.

A similar negative picture is obtained when analyzing the coefficients from the logit model estimating the mean WTP for a general COOL labeling program for meat products. As presented in Table 4, the coefficient associated with the bid amount is negative and statistically significant, as economic theory would predict. And as in the previous model, the coefficients associated with higher levels of education (*HighEdu*) and the presence of children in the household (*Kids*) are negative and statistically significant. As in the other equation, the coefficient associated with the female respondents (*Gender*) is positive, although not statistically significant. The variables *Age* and *LowEdu* carry positive and statistically significant coefficients.

Employing the estimated coefficients from equation (3), and calculating first the grand constant which will replace $\hat{\alpha}$ in (2) we are able to obtain mean WTP point estimates for the COOL labeling program, and for each of the individual labeled products. Logit WTP results indicate that respondents are on average willing to pay about $389.47 per household and year for a mandatory COOL labeling program applied to meat products. This result is much higher than the $183.77 per year for willingness-to-pay for a mandatory beef program estimate obtained by Loureiro and Umberger (2003), although the main difference of results is driven by the different formulas employed to estimate the mean WTP. Note that if in the current study we were to allow the WTP to have negative values, our mean expected value would be $235.15 per family and year, which is much closer to the previous estimate.

When looking at respondents' willingness to pay for COOL of each of the three labeled meat products, consumers are willing to pay an average premium of $1.79 over the initial price of $6.75/lb. for country-of-origin labeling of the ribeye steak, which implies a premium of 26.5% over the original price indicated in the survey. Premiums are even higher for the "Certified U.S." chicken breast and pork chop products. In particular, the estimated average premiums that consumers are willing to pay for a pound of "Certified U.S." chicken breast and "Certified U.S." pork chops are about $0.87/lb. and $1.06/lb. respectively, above the baseline prices for the traditional unlabeled products which were set at $2.07/lb. and $3.46/lb. Thus, on average consumers seem ready to pay about 42% more for COOL of chicken breasts and 30.6% more over the original price for COOL of pork chops. The high premium associated with COOL chicken breast may be explained by the fact that the baseline price of the unlabeled chicken breast was the lowest of the three products; this may have encouraged consumers to pay more for a product they perceive as being initially less expensive (See Figure 1). In general terms, the baseline prices used represent the average U.S. prices during the six previous months to the survey for the different products including all different quality types.

Although these estimates are fairly large, we can conclude that most of the socio-demographic characteristics expected to contribute to explaining these positive consumer responses are not doing so. Consequently, it is likely that non-observable values related to patriotism or general trust in the food system may contribute as much to the WTP values as certain socio-demographics variables do.

In order to further analyze the different roles played by the socio-demographic characteristics in the decision of respondents' WTP for each of the three meat products, equation (4) was estimated. The above specification is rather useful to distinguish whether the WTP for the three types of meats is equally affected by consumer characteristics. Coefficients and corresponding marginal effects are presented in Table 5. Results indicate that consumer socio-demographics seem to play a similar role on the WTP decision for country-of-origin labeled beef and pork. However, the effects of socio-demographics on the WTP decision for chicken are a bit different. For example, the interaction term of age with chicken $(Age_i * Chicken)$ carries a positive coefficient, while the coefficient for this product is negative for the other two meat types. Additionally, the coefficient associate with the interaction of higher education and the indicator variable for chicken $(HighEdu_i * Chicken)$ has a negative sign as it occurs with the other meat types, but the magnitude for the interaction with chicken is the smallest of the meat products. Furthermore, females are much more likely to pay for country-of-origin labeled chicken breast than for steak or pork chops. The cross-product of *HighInc* and *Chicken* is positive and the largest in magnitude, and is also the closest to being statistically significant. Furthermore, the interaction term between the indicator denoting children under 18 in the household and the chicken meat is negative $(Children_i * Chicken)$ although not statistically significant (as it occurs with the other two meat types). Consequently, it is quite plausible that consumers are willing to pay for country-of-origin labeled chicken breast not only because its baseline price is cheaper, but also because consumer preferences are different toward chicken. It may occur that safety perceptions related to chicken products are not as strong as meat and pork. Consequently, U.S. consumers may see "U.S. certified chicken" as a product which assures high

food safety standards. It is interesting to point out that the current USDA guidelines for mandatory COOL do not include labeling of poultry products.

Robustness Checks

Robustness checks performed in the analysis included a test regarding whether the ordering of the questions affects responses (for the meat products). If an ordering effect is present, then the WTP estimates may be biased. Such ordering effects may emerge because of budget restrictions that become more severe the more questions are presented to the respondents. In order to test whether an ordering effect exists, two versions of the survey (A and B) were used altering the order of the questions related to the WTP for "U.S. Certified" of chicken breasts and pork chops. When estimating the WTP equations for chicken breast and pork chops an indicator variable was included to reflect the order in which the question was posed to the respondent. This indicator variable was not statistically significant, implying that the WTP estimates were not affected by the order in which the questions were presented to the respondents.

2.6. Conclusions

The COOL provision has become one of the most polemic labeling programs under debate. In this research consumer response toward a proposed COOL program applied to all meat products, and specifically to ribeye steak, chicken breast, and pork chops is analyzed. Results indicate that participants are willing to pay an average of $389.47 per household annually in order to obtain a COOL program for all meat products. Additionally, consumers are willing to pay high premiums ranging between 25% and 42% of the original market price to obtain "Certified U.S."-labeled ribeye steak, chicken breast and pork chops. Our results also appear to support the idea that consumer preferences for country-of-origin labeled chicken products, which are not currently included in the mandatory COOL program seem to be a bit different than preferences for labeled beef and pork.

Other conclusions drawn from this section of the study indicate that food safety inspection, freshness, and high quality grade are the three attributes consumers ranked the highest among 15 meat characteristics. Additionally, respondents indicated that meat produced domestically is the safest of all major importing countries, followed by meat produced in Canada. According to the majority of the survey respondents (38.6%), the extra costs associated with the COOL program, should be paid for with existing government budgets while reducing expenditures on other programs or infrastructures. Nevertheless, 36.2% of the respondents believe that costs should be paid via higher meat prices that could be used to compensate industry expenditures. With regard the most suited certification agency, about 60% of the consumers indicate that they prefer the government (USDA-AMS inspection services) as the certifiers of the origin of meat products. Thus, overall, the COOL survey results suggest that consumers are willing to support a mandatory COOL labeling program, that they perceive domestic beef to be very safe, and have a strong confidence in U.S. government agencies as potential certifiers. Further research may look at how consumers' perceptions toward COOL vegetables and fruits compare to COOL meat products.

Section 3. Food Safety, Country-of-Origin, Traceability and Tenderness: What's Do Consumers Value Most in Their Beef Purchasing Decisions?

3.1. Overview of Choice Modeling

Many studies in the food marketing and economics literature indicate that consumers are willing to pay substantial amounts for labels verifying the origin of a particular product (Loureiro and Umberger, 2003; Umberger et al., 2002; and Quagraine, Unterschultz, and Veeman; 1998). Many of these previous studies employ contingent valuation methods (similar to those presented in Section 2) to look at the value of these labeled products. A concern stated by researchers working with contingent valuation methodology is that the method, in its simplest form, is only able to attribute a value to a particular good, or resource, without assigning a particular monetary value to each of the multi-attributes that the individual values. In order to overcome this difficulty, and to broaden the understanding and the "scope" in which a particular good is being valued, new techniques involving choice modeling alternatives are being developed. As Adamowicz et al. (1998) indicate, in contrast to the contingent valuation scenario, the choice modeling approach attempts to understand the respondents' preferences over the attributes of the scenario rather than a single specific scenario.

Furthermore, recent consumer research indicates that U.S. consumers are willing to pay a premium for a beef product that is labeled with its country of origin, is traceable to the farm-of-origin, and is guaranteed tender. Previous studies estimating the value consumers place on country-of-origin, and the other mentioned attributes, have examined these attribute in isolation of the other attributes which may be of equal or greater importance to consumers. These previous studies, while interesting, provide limited information about the relative value that consumers assign to each independent attribute that makes up a food product. The relative valuation of beef attributes is particularly interesting in light of the recent discussions related to the 2002 mandatory country of origin labeling law and the proposed national identification plan (which could increase the ease in which beef could be traced to the farm level). It is important for the beef industry to understand the relative value consumers place on these attributes.

In this section, we examine U.S. consumer choices between pairs of steaks varying in a set of attributes: country-of-origin, traceable to the farm of origin, food safety inspection, tenderness and price. We employ a unique choice modeling approach, in which survey respondents selected between different types of a common set of characteristics evaluated at different levels.

3.2. Choice Modeling Methodology

As mentioned previously, the choice sets, presented to respondents in the survey, allowed individuals to select between two alternative options (two types of ribeye steak) that each contain a number of attributes at different levels. Thus, instead of asking consumers whether they would be willing to pay a given amount of money for a country-of-origin labeled beef steak, they were asked to select their preferred alternative between the two steaks with varying attributes.

Formally, the approach is based on the random utility theory framework (Hanemann and Kaninnen, 2003), and there exist numerous applications in marketing, transportation economics and environmental economics (see for example, Burton et al., 2001).

The basic assumption of random utility theory is based on the premise that individuals act rationally, selecting the alternative that yields the maximum utility. Consequently, the probability of selecting a given alternative will be higher if the utility provided by such alternative is the highest among the different choices. Thus, we can express individual i's utility associated with the choice of alternative j as:

$$U_{ij} = \overset{J}{U}_{ij} + e_{ij} \tag{3.1}$$

such that $\overset{J}{U}_{ij}$ is the utility function that the researcher models, and ε_{ij} is a random error component, which implies that from the researcher's view point, the true utility remains unobservable.

From the consumer's viewpoint, the process of maximization of utility consists of selecting an alternative, such that the utility from choosing the j^{th} alternative is not observable, but the consumer's choice is observable. Accordingly, if the i^{th} consumer selects type j, then U_{ij} is the highest utility obtainable from among the J possible choices. Hence, the statistical model of the probability that alternative j is chosen by individual i is given by

$$\begin{aligned} Prob_{ij} &= \Pr ob(U_{ij} > U_{ia}; a = 1, 2, ..., J, a \neq j) = \\ & Prob(\varepsilon_{ij} - \varepsilon_{ia} > \hat{U}_{ia} - \hat{U}_{ij}; a = 1, 2, ..., J, a \neq j), \end{aligned} \tag{3.2}$$

where $\hat{U}_{ij} = X_i \beta_j$. Maddala (1996) shows that when the residuals are independently and identically distributed following a Type I Extreme Value distribution, such as:

$$F(\varepsilon_{ij}) = e^{\left(-e^{-\varepsilon_{ij}}\right)}, \tag{3.3}$$

then it follows that the difference in error terms, displayed in equation (3.2), has a logistic distribution. Therefore, a multinomial (conditional) logit model can represent the i^{th} consumer's probability of selecting the j^{th} steak choice:

$$\text{Prob}(y_i = j) = \frac{e^{X_i \beta_j}}{\sum_{k=1}^{J} e^{X_i \beta_j}} \text{ for } j = 1, \ldots, J, \tag{3.4}$$

where β_j refers to parameters that weight exogenous variables in determining the utility of choice j; and X_i is a row vector of exogenous variable values corresponding to the steak characteristics, and socio-demographics of the i^{th} consumer. The parameters in equation (3.4) are unidentified since more than one set of parameters can generate identical probability values. To

identify the parameters of the model, constraints on the β's must be imposed. The most common constraint in multinomial logit models, and the one we adopt without loss of generality, is that $\beta_1 = 0$. The log likelihood of the multinomial logit is given by:

$$L = \prod_{i=1}^{n} \prod_{j=1}^{J} \Pr ob(y_i = j)^{y_{ij}}, \tag{3.5}$$

where $y_{ij} = 1$ if alternative j is chosen by the i^{th} individual, and zero otherwise.

3.3. Choice Set Design

In the choice-modeling questions presented in the survey, participants were given the opportunity to select between two ribeye steak types (A and B) carrying different prices and different extrinsic attributes (such as country-of-origin labeling, traceability, food safety inspection, and tenderness). The larger the number of attributes that consumers face, the more difficult the selection becomes, therefore, in order to minimize the number of choice sets required, without losing relevant information for the purposes of this study, only five different attributes were used. The included attributes were selected based on the results obtained by different researchers regarding the attributes most preferred by meat eaters (See Loureiro and Umberger, 2003; Umberger et al., 2003; and Loureiro and McCluskey, 2000).

The choice set design was created employing fractional factorial design generation. In particular, we generated full factorial design for 10 variables, each with two attributes levels. The procedure called *proc optex* in SAS was used to find a design that maximizes the D-Efficiency and A-Efficiency scores. The goal of D-optimality is to maximize the determinant of the information matrix, while A-optimality attempts to minimize the sum of the variances of estimated coefficients. Later, the DETMAX algorithm of Mitchell (1974) was performed to search for this design, where the starting point was determined by the random seed. Thus, the final design was selected based on the optimal combination of high D-Efficiency and A-Efficiency, less choice sets, and minimal correlation between factors. This optimal combination utilized 12 choice sets and a random seed of 501.

To avoid participants' fatigue, each participant was asked to select between the two different ribeye steaks A and B in six repeated occasions, which provide us with a total number of 3,786 responses. However, because some consumers selected the status quo option, as their favorite, the total data points for analysis was reduced to 2,319. An example of each of the multiple-choice sets that participants were presented with is presented in the appendix.

3.4. Empirical Specification

The empirical specifications of the utility levels underlying the multinomial logit framework make references to the attributes of each choice, and were formulated as follows:

$$(3.6) \quad U_{ij} = \beta_{1j}\,\mathrm{Price} + \beta_{2j}\mathrm{COOL} + \beta_{3j}\mathrm{Traceability} + \beta_{4j}\mathrm{FoodSafety} + \beta_{5j}\mathrm{Tenderness} + \varepsilon_{ij}.$$

Because U_{ij} is the latent unobservable utility level that the i^{th} consumer obtains from choosing the j^{th} steak type, the observed choice is a reflection of this latent unobservable utility. Note that in the above specification, *Price* represents the price expressed in dollars per pound of steak, while *COOL, Traceability, FoodSafety, and Tenderness* are indicator variables that denote respectively, whether the product carries a label identifying the country-of-origin in which it was produced; whether the steak carries a label identifying that the product's origin can be traced to the original farm in which it was produced; whether the product carries a label guaranteeing the product was inspected by the USDA; and whether the product carries a label indicating that the steak is *"guaranteed tender"*.

An additional specification may include socio-demographic variables such age, gender, income and education. Given that in our study the variable of interest is COOL, we interacted COOL with other socio-demographic variables, in order to test whether some specific groups of consumers are more or less likely to select a steak with a COOL label, over a steak without the COOL label. In particular, the second specification estimated takes the following form:

$$\begin{aligned}(3.7) \quad & U_{ij} = \beta_{1j}\,\mathrm{Price} + \beta_{2j}\mathrm{COOL} + \beta_{3j}\mathrm{COOL}*\mathrm{Age} + \beta_{4j}\mathrm{COOL}*\mathrm{Gender} + \\ & \beta_{5j}\mathrm{COOL}*\mathrm{Income} + \beta_{6j}\mathrm{COOL}*\mathrm{HighEdu} + \beta_{7j}\mathrm{MidEdu} + \beta_{9j}\mathrm{Traceability} + \\ & \beta_{10j}\mathrm{FoodSafety} + \beta_{11j}\mathrm{Tenderness} + \varepsilon_{ij}\end{aligned}$$

The multinomial logit model based on (3.6) and (3.7) was used within a maximum likelihood framework to estimate consumer choice behavior under the condition that different steak choices had different attributes.

Given that in a multinomial (conditional) logit, one of the choice vectors has to be normalized to be equal zero, we center our discussion in terms of the corresponding marginal effects for comparison purposes between the factors affecting the two steak choices. The marginal effects are a direct interpretation of the effects of each particular explanatory variable in terms of the associated probability of choosing each steak choice. As reported in Table 6, all coefficients are statistically significant at conventional critical levels, and the relationship with the utility function is as expected. Thus, increments on the price decrease the associated utility level provided by the choice, whereas increments on any of the other considered attributes increases the utility.

Table 7 reports the results obtained with specification in (3.7). Results indicate that socio-demographic characteristics are not statistically significant in the selection of country-of-origin labeled steaks. Thus, there is no group of consumers based on socio-demographic characteristics that is more likely to select the country-of-origin labeled steak versus the steaks labeled with the other attributes. The main results obtained with specification of equation (3.6) prevail in terms of signs and associated magnitudes of the coefficients.

3.5. Estimating WTP for steak attributes

As expressed above, in the multinomial logit the coefficients cannot be directly interpreted as the direct effects of the respective explanatory variables on the probability of choosing each particular steak type. Rather, they represent the direct effects associated with each of the explanatory variables on the (unobservable) utility function. If we specify *j* in Equation 3.6 to be a specific steak type, then we get the utility equations derived from choosing each steak type, such as:

$$U_{i,Type} = \beta_{1,Type}\,\mathrm{Price} + \beta_{2,Type}\mathrm{COOL} + \beta_{3,Type}\mathrm{Traceability} + \beta_{4,Type}\mathrm{FoodSafety} + \beta_{5,Type}\mathrm{Tender} + \varepsilon_{i,Type} \quad (3.8)$$

Nevertheless, the above coefficients can be used to calculate the mean WTP estimates. Thus, following Hanemann (1989), each of the estimates is calculated as the ratio of the coefficient associated with the attribute of interest over the *Price* coefficient (see Layton and Brown for an application). Thus,

$$\mathrm{WTP(COOL)} = \frac{-\beta_2}{\beta_1} \quad (3.9)$$

Employing this straightforward formula it is possible to calculate the mean WTP for each of the considered attributes.

3.6. Choice Experiment Results

For comparison purposes, the WTP estimates for each attribute are reported in Table 8. Results indicate that although the country-of-origin label carries a positive premium ($0.56/lb. of steak), this is the smallest premium carried by any of the considered attributes. Thus, on average, $0.56/lb. is the premium that makes consumers indifferent between the two levels of utility, associated with no country of origin labeling in the steak, and the payment of $0.56/lb. and the presence of a label denoting the country of origin. In particular, labels that certified that the steak has been inspected by USDA food safety inspectors *(FoodSafety)* carry the highest premium of $3.89/lb. of steak. The other attributes indicating that the product is traceable to the farm where the animal was produced on *(Traceability)*, and that it is guaranteed tender *(Tenderness),* carry premiums about $1.03/lb., and $1.14/lb., respectively.

To understand the present results, it is necessary to indicate that COOL in this choice set experiment was described as a labeling program that identifies a country from which the product was produced. Consequently, it was exclusively a signal of origin, which would be implemented on either imported or domestic products. Therefore, our results indicate that food safety assurance is the main driving force that consumers are willing to pay for, rather than geographical origin. However, in the current study, consumers expressed a very high level of confidence with the U.S. meat system, which likely lead to large consumer response and stated

WTP values for "U.S. meat products" via the dichotomous choice questions discussed in Section 2.

Conclusions and Policy Implications

Recent consumer surveys (Loureiro and Umberger (2003), Umberger et al. (2002)) as well as the current research presented in Section 2 indicate U.S. consumers have a strong desire in obtaining and paying for country-of-origin labeled products, particularly if these are domestic products. Nevertheless, a dichotomous choice question provides limited information about the value that consumers assign to each independent attribute that makes up a product.

In this section, using a choice set experimental design, we provide further information about the relative importance of country of origin labeling. In particular, we conclude that when COOL is not associated with a particular origin, and it is simply presented as a designation of origin, without carrying any particular connotation, or reputation for a certain quality, consumers' WTP for such an attribute in ribeye steak is fairly low, being 0.56 dollars per pound, while labels that denote that the steak has been food safety inspected carry premiums about 3.89 dollars per pound. These relatively lower consumers' WTP estimates for country-of-origin labeling versus food safety inspection, traceability, and tenderness may revive the debate of whether or not a policy that provides such information will pass a benefit- cost analysis.

References

Adamowicz, W., P. Boxall, M. Williams, and J. Louviere. "Stated Preference Approaches for Measuring Passive Use Values: Choice Experiments and Contingent Valuation." *American Journal of Agricultural Economics,* 80 (1998):64-75.

Andersen. R.S. and S. Kay. "COOL Cost Assessment." Published by the Sparks/CBW COOL Consortium. April 2003. http://www.ams.usda.gov/cool/comments/cool1041.pdf. Accessed May 14, 2003.

Becker, G. S. "Country-of-Origin Labeling for Foods: Current Law and Proposed Changes." The Committee for the National Institute for the Environment, 1725 K. Street, NW, Suite 212, Washington DC, October 21, 1999.

Burton, M., D. Rigby, T. Young, and S. James. "Consumer Attitudes to Genetically Modified Organisms in Food in the UK. " *European Review of Agricultural Economics*, 28(4)(2001):479-498.

Edwards, S.F. and G.D. Anderson. "Overlooked Biases in Contingent Valuation Surveys: Some Considerations." *Land Economics,* 63 (1987): 168-78.

Farm Bill Conference Framework. "Farm Bill Conference Summary." April 30, 2002. http://www.senate.gove/~agriculture/Briefs/2001FarmBill/conframe.htm.

Hanemann, W.M. "Welfare Evaluations in Contingent Valuation Experiments with Discrete Response Data: Reply." *American Journal of Agricultural Economics*. 71(1989): 1057-1061.

Layton, D. F. and G. Brown. "Heterogeneous Preferences Regarding Global Climate Change." *The Review of Economics and Statistics*, 82(4)(2000):616-624.

Loureiro, M.L. and J.J. McCluskey. "Assessing Consumer Response to Protected Geographical Identification Labeling." *Agribusiness: An International Journal* 16(3 2000) 309-320.

Loureiro, M.L. and W.J. Umberger. "Estimating Consumer Willingness to Pay for Country-of-Origin Labeling." *Journal of Agricultural and Resource Economics*. 28(August 2003): 287-301.

Maddala, G.S. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge University Press, 1997.

Mitchell, R.C. and R.T. Carson. *Using Survey to Value Public Goods: The Contingent Valuation Method*, Resources for the Future, Washington, DC, 1989.

Quagrainie, K., J. Unterschultz and M. Veeman. "Effects of Product Origin and Selected Demographics on Consumer Choice of Red Meats." *Canadian Journal of Agricultural Economics.* 46(1998): 201-219.

Roosen, J., J.L Lusk and J.A. Fox. "Consumer Demand for and Attitudes Toward Alternative Beef Labeling Strategies in France, Germany, and the UK." *Agribusiness: An International Journal* 19(1 2003): 77-90.

Schupp, A. and J. Gillespie. "Handler Reactions to Potential Compulsory Country-of-Origin Labeling of Fresh or Frozen Beef." *Journal of Agricultural and Applied Economics.* 33(April 2001a): 161-171.

Schupp, A. and J. Gillespie. "Consumer Attitudes Toward Potential Country-of-Origin Labeling of Fresh or Frozen Beef." *Journal of Food Distribution Research.* 33(November 2001b): 34-44.

Umberger, W.J., D.M. Feuz, C.R. Calkins, and K. Killinger. "U.S. Consumer Preference and Willingness-to-Pay for Domestic Corn-fed versus International Grass-Fed Beef Measured through and Experimental Auction." *Agribusiness: An International Journal*. 18(Autumn 2002): 491-504

Umberger, W.J., D.M. Feuz, C.R. Calkins and B. Sitz. "Country-of-Origin Labeling of Beef Products: U.S. Consumers' Perceptions." Invited paper, 2003 FAMPS Conference: Emerging Roles for Food Labels: Inform, Protect, Persuade. Washington D.C. March 20-21, 2003. http://www.farmfoundation.org/projects/documents/Umberger.pdf.

U.S. Census Bureau. "United States Census, 2000." http://www.census.gov.

USDA-AMS, United States Department of Agriculture Agricultural Marketing Service. 2002 Farm Bill Provisions, Subtitle D - Country of Origin Labeling. May 2002a. http://www.ams.usda.gov/cool/subtitled.htm. Retrieved May 28, 2003.

USDA-AMS, United States Department of Agriculture Agricultural Marketing Service. *Federal Register*. "Establishment of Guidelines for the Interim Voluntary Country of Origin Labeling of Beef, Lamb, Pork, Fish, Perishable Agricultural Commodities, and Peanuts Under the Authority of the Agricultural Marketing Act of 1946." Vol. 67, No 198. October 2002b. http://www.ams.usda.gov/COOL/ls0213.pdf. Retrieved May 28, 2003.

USDA-ERS, United States Department of Agriculture Economic Research Service. Data: Retail Scanner Prices for Meat. http://ers.usda.gov/data/MeatScanner/ Accessed March 30, 2003.

Whitehead, J.C. "Environmental Interest Group Behavior and Self-Selection Bias in Contingent Valuation Mail Surveys," *Growth and Change*. 22(1991):10-21.

Table 1. Summary Statistics for the Demographic Variables

Variable Name	Description (Coding)	Mean	Std. Dev.
Age	In years	55.118	21.182
Gender	1 if female, 0 if male	0.532	0.511
Shopper	1 if primary household shopper, 0 if otherwise	0.857	0.349
Education	1 = Elementary, 2 = Some High School, 3 = HS Diploma, 4 = Some College, 5 = Junior College, 6 = B.A. or B.S., 7= Graduate School	5.107	1.674
Children	1 if children < 18 living in the household, 0 if otherwise	0.346	0.501
Family Size	Number of family members living in the household	1.904	0.745
Income	2002 annual household income: 1 = <$20,000 2 = $20,000-$29,999 4 = $30, 000-$39,999 5 = $40, 000-$49,999 6 = $50, 000- $59,999 7 = $60, 000- $69,999 8 = > =70,000	6.134	2.789
Race	1 if Caucasian, 0 if other	0.912	0.283

Table 2: Ranking of Desirable Meat Attributes (1 = Not at All Desirable; 5 = Extremely Desirable)

Attribute	Mean	Std. Dev.
Meat produced or raised locally	3.451	1.135
Meat produced in the United States	4.306	0.878
Source Assurance (knowing who produced your meat)	3.857	1.100
Premium Brand	3.714	0.987
Freshness	4.771	0.472
Reasonably Priced	4.357	0.769
Organic Production Methods	2.969	1.174
Lean	4.165	0.803
No Added Growth Hormones or Antibiotics	4.022	1.140
High Quality Grade	4.406	0.674
Tenderness Assurance	4.164	0.816
Nutritional Value	4.117	0.863
Food Safety Inspected (E-coli and Salmonella-free)	4.802	0.503
Humane Production Methods	3.750	1.192
Good Visual Presentation	4.236	0.815

Table 3. Perceived Safety of Meat Products from Various Countries of Origin (1 = Not at all Safe; 5 = Extremely Safe)

Country of Origin	Mean	Std. Dev.
United States	4.216	0.678
Canada	3.657	0.842
México	2.135	0.836
Australia	3.130	0.921
New Zealand	3.082	0.951
Denmark	2.989	0.929
Argentina	2.623	0.901

Table 4: Estimated Coefficients and Associated WTP Estimates

	WTP Equation for the Labeling Program			WTP for each of the labeled COOL meat products		
Variables	**Coefficient**	**Std. Error**	**P-value**	**Coefficient**	**Std. Error**	**P-value**
Bid	-0.003	0.001	0.003	---	---	---
BidChick	---	---	---	-0.789	0.131	0.000
BidBeef	---	---	---	-0.383	0.045	0.000
BidPork	---	---	---	-0.644	0.084	0.000
Age	0.013	0.001	0.003	-0.001	0.003	0.871
LowEdu	0.408	0.163	0.012	0.028	0.153	0.854
HighEdu	-0.273	0.126	0.030	-0.498	0.129	0.000
Gender	0.094	0.110	0.395	0.481	0.111	0.000
LowInc	-0.412	0.168	0.014	-0.103	0.166	0.536
HighInc	0.077	0.139	0.581	0.167	0.139	0.229
Children	-0.018	0.127	0.888	-0.386	0.126	0.002
Constant	-0.008	0.293	0.979	0.0542	0.252	0.830
Log-Likelihood	-949.085			-992.664		
Log-Likelihood Ratio (P-value)	47.970 (0.000)			152.960 (0.000)		
WTP Labeling Program	389.470 (100.940)					
WTP Beef	1.789 (0.521)					
WTP Pork	1.064 (0.309)					
WTP Chicken	0.868 (0.253)					

Table 5: Estimated Coefficients and Associated WTP Estimates (Extended Model)

Variables	Coef.	Std. Error	P-value	Marginal Effects	Std. Error	P-value
BidChick	-1.1297	0.180	.000	-.2278	.0362	.000
BidBeef	-.2806	.0597	.000	-.0566	.0119	.000
BidPork	-.6267	.1125	.000	-.1264	.0224	.000
*Age*Chicken*	.0024	.0040	.543	.0005	.0008	.543
*Age*Beef*	-.0040	.0046	.380	-.0008	.0009	.380
*Age*Pork*	-.0005	.0040	.894	-.0001	.0008	.894
*LowEdu*Pork*	.1626	.2617	.534	.0338	.0559	.546
*LowEdu*Beef*	-1.588	.2731	.561	-.0310	.0516	.548
*LowEdu*Chick*	.0671	.2544	.792	.0137	.0526	.794
*HighEdu*Pork*	.1626	.2617	.534	-.0983	.0368	.008
*HighEdu*Beef*	-.5906	.2269	.009	-.1081	.0371	.004
*HighEdu*Chick*	-.4076	.2064	.048	-.0770	.0363	.034
*Gender*Pork*	.4597	.1901	.0870	.0983	.0426	.021
*Gender*Beef*	.4185	.1978	.034	.0891	.0441	.043
*Gender*Chick*	.5617	.1793	.2102	.1214	.0410	.003
*LowInc*Pork*	-.1590	.2835	.575	-.0310	.0536	.562
*LowInc*Beef*	.0300	.2948	.919	.0060	.0601	.919
*LowInc*Chick*	-.1603	.2727	.557	-.0313	.0515	.543
*HighInc*Pork*	.0941	.2291	.681	.01923	.0473	.685
*HighInc*Beef*	.2039	.2387	.393	.0422	.0505	.403
*HighInc*Chick*	.2100	.2167	.332	.0435	.0461	.345
*Children*Beef*	-.7824	.2297	.001	-.1356	.0331	.000
*Children*Pork*	-.3718	.2105	.077	-.0700	.0368	.057
*Children*Chick*	-.1062	.1959	.588	-.0210	.0380	.058
Constant	.0710	.2582	.783			
Log-likelihood	-984.79					
Likelihood Ratio Test (24) (P-value)	168.70 (0.000)					

Table 6. Discrete Choice Multinomial Logit Results (derived from equation 3.6)

Variables	Coefficient	Std. Error	T-ratio	P-value
Price	-0.663455	0.035919	-18.4709	0.0000
Cool	0.373152	0.117325	3.1805	0.0014
Trace	0.684287	0.0986135	6.93908	0.0000
FoodSafety	2.58326	0.107212	24.0949	0.0000
Tender	0.755543	0.117513	6.42947	0.0000
Log-Likelihood Value	-793.648			
R-squared	0.518			

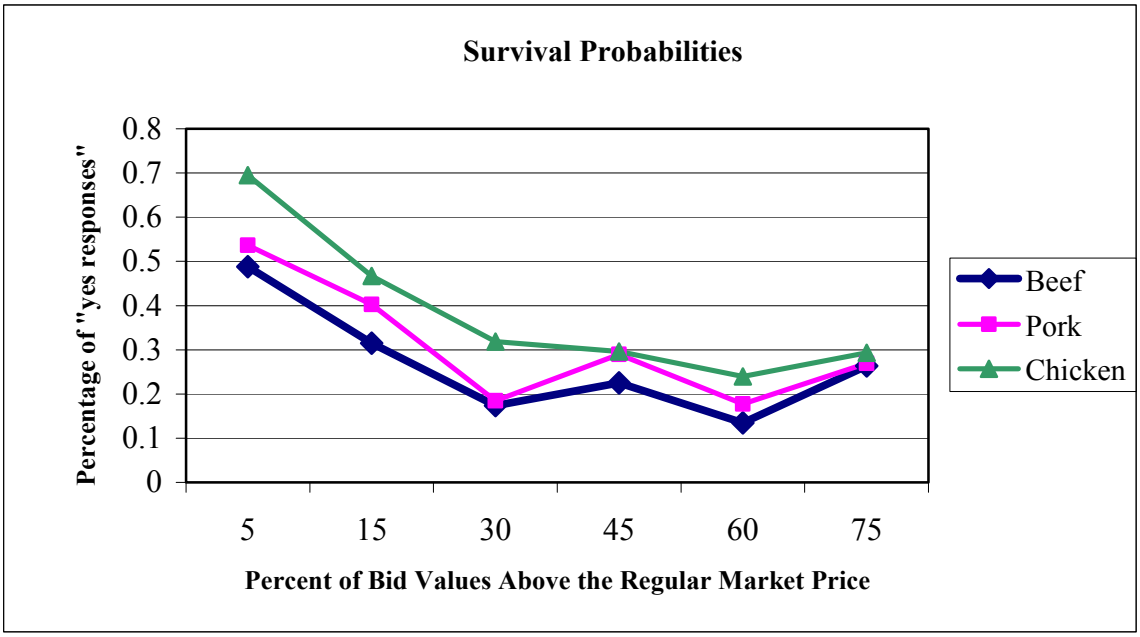
Table 7. Discrete Choice Logit Results (derived from equation 3.7)

	Coefficient	Std. Err.	t-ratio	p-value
Price	-0.6833	0.0385	-17.7312	0.0000
Cool	1.1666	0.5970	1.9539	0.0507
Cool*Age	-0.0034	0.0065	-0.5253	0.5993
Cool*Gender	-0.2130	0.2032	-1.0482	0.2945
Cool*Income	-0.0062	0.0060	-1.0309	0.3026
Cool*HighEdu	-0.1581	0.3035	-0.5208	0.6025
COOL*MidEdu	0.0296	0.3100	0.0954	0.9240
Trace	0.5128	0.1048	4.89179	0.0000
FoodSafety	2.5771	0.1069	24.1083	0.0000
Tender	0.7316	0.1145	6.3904	0.0000
Log-Likelihood Value	-738.68			
R-squared	0.522			

Table 8. Mean Willingness to Pay Estimates (derived from equation 3.6)

Attribute	Mean WTP ($/lb of steak)
WTP for country-of-origin labeling	0.562
WTP for Traceability	1.031
WTP for FoodSafety Certification	3.894
WTP for Tenderness	1.138

Figure 1. Survival Probabilities Associated with the WTP Responses for the three COOL labeled products

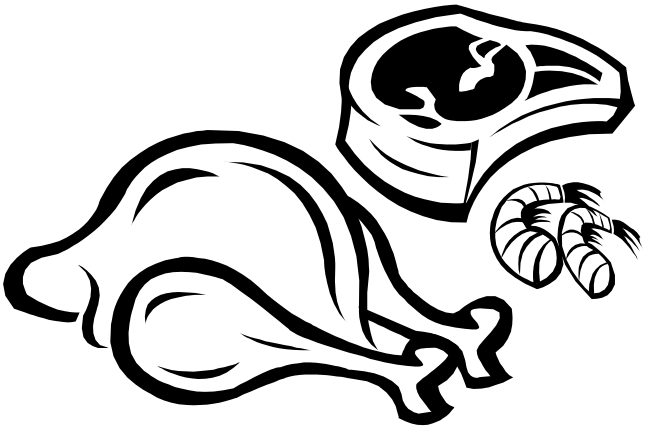


Appendix

Choice Set Example Extracted From One of the Survey Versions:

Consider each of the following 6 boxes (20.1 through 20.6) as separate sets of choices, in each of the 6 boxes on the next few pages please select the beef steak choice (Option A-C) that better matches your preferences:

20.1	**Option A**	**Option B**	**Option C**
Price	6.75	9.45	Neither Option A nor B Is Preferred
Country of Origin Labeled	No	Yes	
Traceable to the Farm	Yes	No	
Food Safety Inspected	No	Yes	
Guaranteed Tender	No	Yes	
I would choose: (Please Mark Only One Box) ⟶	☐	☐	☐



Study of U.S. Consumer Perceptions Towards Country-of-Origin Labeling

Research approved
and conducted by

Colorado State University

Department of Agricultural and Resource Economics
Fort Collins, CO-80526
VB-2

MEAT LABELING SURVEY

1. Are you the person who usually purchases most of the groceries for your household?
    a. Yes
    b. No

2. Do you eat meat and meat products?
    a. Yes
    b. No (if you answer no and you never eat any meat products, please skip to question 11 and answer all of the following relevant questions)

3. How often do you eat the following types of meat considering all meals? (Please **check one box** for each type of meat)

Meat	**Every day**	**Between 3-6 times per week**	**Once or twice per week**	**Every two weeks**	**Once per month**	**Never**
Ground Beef or Hamburger						
Beef Steak (ex. Ribeye, Sirloin, T-bone, Round)						
Chicken						
Pork						
Lamb						

4. The following is a list of attributes people may look for when purchasing meat. Please indicate the desirability of each feature by circling a number from 1 to 5, where:

Attribute	1= Extremely Desirable	2= Very Desirable	3= Somewhat Desirable	4= Not very Desirable	5= Not at all Desirable
a. Meat that was produced or raised locally	1	2	3	4	5
b. Meat that was produced in the United States	1	2	3	4	5
c. Source Assurance (knowing who produced your beef)	1	2	3	4	5
d. Premium Brand	1	2	3	4	5
e. Freshness	1	2	3	4	5
f. Reasonably Priced	1	2	3	4	5
g. Environmental Production Methods (Organic)	1	2	3	4	5
h. Is Lean	1	2	3	4	5
i. No added growth hormones and antibiotics	1	2	3	4	5
j. High Quality Grade	1	2	3	4	5
k. Tenderness Assurance	1	2	3	4	5
l. Nutritional Value	1	2	3	4	5
m. Food Safety Inspected (E-coli and salmonella-free)	1	2	3	4	5
n. Humane production methods	1	2	3	4	5
o. Good Visual Presentation	1	2	3	4	5

Please turn to page 2 ⟶

5. Please rank in order of importance, the locations where you typically purchase your meat products? (Rank 1-5 the most important locations, **1 = being the primary place of purchase;** if you only purchase meat from 1 or 2 locations only rank those locations where you actually purchase meat from)

a. _____Supermarket
b. _____Natural foods store
c. _____Farmers Market (during season)
d. _____Butcher Shop
e. _____Direct from producer or cooperative
f. _____Internet
g. _____Direct Mail
h. _____Other (please describe)_____

6. In general, how SAFE do you consider the meat products originating from the following countries?

Country of Origin	1= Extremely Safe	2= Very Safe	3= Somewhat Safe	4= Not very Safe	5= Not at all Safe
a. United States	1	2	3	4	5
b. Canada	1	2	3	4	5
c. México	1	2	3	4	5
d. Australia	1	2	3	4	5
e. New Zealand	1	2	3	4	5
f. Denmark	1	2	3	4	5
g. Argentina	1	2	3	4	5

7. In each of the three columns below for Beef (7.1), Pork (7.2), and Poultry (7.3) products, please check the box indicating the country that you would prefer to purchase your meat from:

	7.1 Beef products	7.2 Pork Products	7.3 Poultry Products
Country of Origin	Please Mark the country you most prefer to purchase your **BEEF** products from:	Please mark the country you *most prefer* to purchase your **PORK** products from:	Please Mark the country you most prefer to purchase your **POULTRY** products from:
a. United States			
b. Canada			
c. Argentina			
d. Brazil			
f. New Zealand			
g. Mexico			
h. Denmark			
i. Other country- (please specify)			

Labeling of Meat Products:

8. What type of information do you look for when buying beef and beef products? **(please rank 1-5; 1= most important)**

____ Expiration date
____ Nutritional value
____ Price
____ USDA Choice or Select label
____ Other industry brand labels such as Certified Angus Beef, Coleman's Beef, Cattleman's Collection, etc.
____ Production techniques labels (Organic Beef, "Natural Beef," Hormone-Free Beef)
____ Other (please describe)_____

Please turn to page 3 ⟶

9 Are you usually familiar with the origination of the beef products that you purchase?
   a. Yes
   b. No

10. Have you ever purchased a meat product labeled with its country of origin?
   a. Yes
   b. No
   c. Do not know

11. Suppose that you were asked to give your opinion regarding a "country-of-origin" labeling program in the United States. If implementation of this mandatory country-of-origin labeling program for meat products would cost your household **$ ["BID"]/year in higher meat prices,** what would your position be with respect to this mandatory labeling program?
   a. In favor of a mandatory program
   b. Against a mandatory labeling program (please go to question 13)

12. In the case that you circled **"In favor"** in question 11, why do you support "country-of-origin labeling" for meat products? (please circle or describe below the *most important reason* for your answer in question 11)

a. Because you would like to *support* products produced in the United States
b. Because you only *trust in the quality and safety* of beef produced in the United States
c. Because you think that you have the *right to know* where your beef is coming from
d. Because although you do not discriminate between domestic and imported beef, you are curious to learn where your beef is coming from.
e. Other (*please describe in the space below*)

13. In the case you circled **"Against"** in question 11, with the labeling program of "country-of-origin" labeling of beef, what reasons do you have? (please circle or describe the *most important reason* for your answer in question 11)

a. Because you believe the *cost* of a mandatory labeling program is *too high,* although you would like to pay a lower amount.
b. Because you believe that labeling of imported beef will prevent poor countries from exporting beef to the U.S., since consumers may not trust beef from other countries.
c. Because you already know that imported beef that comes into the U.S. is carefully inspected and Needs to fulfill similar requirements in terms of food safety and hygiene as domestic beef.
d. Because you *don't care* where your beef is coming from, and you do not feel you want to pay anything extra in order to obtain this information.
e. Other (*please describe in the space below*):

Please turn to page 4 ⟶

14. Now, assume that the "cost of traceability" required to label a ribeye beef **steak** as "Certified U.S. Beef" is **$ ["BID"]/lb** *in addition* to the traditional $6.75/lb price, would you be willing to pay this premium in order to guarantee that your beef is "Certified U.S. Beef"?
    a. Yes
    b. No

    If you answered "no", would you be willing to pay $0.10/lb?
    a. Yes
    b. No

15. Assuming that the "cost of traceability" required to label a package of boneless, skinless **chicken breast** as "Certified U.S. Chicken" is **$ ["BID"]/lb** *in addition* to the traditional $2.07/lb. Would you be willing to pay this premium in order to guarantee that the Chicken is "Certified U.S. Chicken"
    a. Yes
    b. No

    If you answered "no," would you be willing to pay $0.10/lb?
    a. Yes
    b. No

16. Now, assuming that the "cost of traceability" required to label a package of **pork chops** as "Certified U.S. Pork" is **$ ["BID"]/lb** *in addition* to the traditional $3.46/lb price, would you be willing to pay this premium in order to guarantee that your pork is "Certified U.S. Pork"?
    a. Yes
    b. No

    If you answered "no", would you be willing to pay $0.05/lb?
    a. Yes
    b. No

17. When you are purchasing meat and other meat products, what is the importance of food safety and quality assurance versus price on a scale of 1 to 10, where **1 means price is most important**, and **10 means food safety assurance is most important**?

    1 2 3 4 5 6 7 8 9 10

18. What entity do you think would do a better job certifying the origin of the beef you eat?
    a. Government (USDA-AMS inspection services)
    b. Local producers
    c. Third party independent certifiers
    d. Other (please describe)_____

19. From all you know, what mechanism you think is the fairest to pay for the costs that may arise from this mandatory country of origin labeling program?
    a. Higher meat prices that could compensate industry expenditures
    b. A higher income tax
    c. Use of existing government budget reducing expenditures on other programs or infrastructures
    d. Fees applied to producer organizations, and general donations
    e. Other mechanism such as_____ (Please describe in the blank or the space below)

Please turn to page 5 ⟶

20. Suppose that you are presented with two choices of beef ribeye steaks (Option A and Option B) when you visit the meat case in your supermarket during a given month. Steaks A and B have different attributes that we describe below for you. While many attributes vary from Steak A to Steak B, both of the steaks are USDA Choice grade. The USDA steak quality grades are primarily determined by the amount of marbling (intramuscular fat) found in a steak. A Ribeye steak with a USDA Choice grade is moderately marbled.

The following is a description of the attributes that may vary from Steak A to Steak B:

- **Price =** The price is expressed in the dollars per pound of steak that you would pay for the steak you choose.
- **Traceable to the Farm** = The product is traceable to the farm that the animal was produced on.
- **Country-of-Origin Labeled** = The product carries a label identifying the country from which it was produced.
- **Food Safety Inspected** = The steak carries a label guaranteeing to have been inspected by the USDA (imported beef may also be inspected by the USDA)
- **Guaranteed Tender =** The USDA has developed a technology to categorize the tenderness of a steak using shear force. A steak that is *"guaranteed tender"* carries a label verifying that the steak is tender. A steak that does not carry the label has not been tested for tenderness.

Consider each of the following 6 boxes (20.1 through 20.6) as separate sets of choices, in each of the 6 boxes on the next few pages please select the beef steak choice (Option A-C) that better matches your preferences:

20.1	**Option A**	**Option B**	**Option C**
Price	6.75	9.45	Neither Option A nor B Is Preferred
Country of Origin Labeled	No	Yes	
Traceable to the Farm	Yes	No	
Food Safety Inspected	No	Yes	
Guaranteed Tender	No	Yes	
I would choose: (Please Mark Only One Box) →	☐	☐	☐

20.2	**Option A**	**Option B**	**Option C**
Price	6.75	9.45	Neither Option A nor B Is Preferred
Country of Origin Labeled	Yes	No	
Traceable to the Farm	Yes	No	
Food Safety Inspected	Yes	Yes	
Guaranteed Tender	Yes	Yes	
I would choose: (Please Mark Only One Box) →	☐	☐	☐

20.3	**Option A**	**Option B**	**Option C**
Price	9.45	6.75	Neither Option A nor B Is Preferred
Country of Origin Labeled	No	No	
Traceable to the Farm	Yes	Yes	
Food Safety Inspected	Yes	Yes	
Guaranteed Tender	Yes	Yes	
I would choose: (Please Mark Only One Box) →	☐	☐	☐

Please turn to page 6 →

20.4	Option A	Option B	Option C
Price	6.75	6.75	Neither Option A nor B Is Preferred
Country of Origin Labeled	No	Yes	
Traceable to the Farm	Yes	No	
Food Safety Inspected	Yes	No	
Guaranteed Tender	Yes	No	
I would choose: (Please Mark Only One Box) ⟶	☐	☐	☐

20.5	Option A	Option B	Option C
Price	9.45	9.45	Neither Option A nor B Is Preferred
Country of Origin Labeled	Yes	Yes	
Traceable to the Farm	Yes	Yes	
Food Safety Inspected	No	No	
Guaranteed Tender	Yes	No	
I would choose: (Please Mark Only One Box) ⟶	☐	☐	☐

20.6	Option A	Option B	Option C
Price	9.45	9.45	Neither Option A nor B Is Preferred
Country of Origin Labeled	No	No	
Traceable to the Farm	No	No	
Food Safety Inspected	No	Yes	
Guaranteed Tender	Yes	No	
I would choose: (Please Mark Only One Box) ⟶	☐	☐	☐

The following information is necessary for statistical analysis only and will be held entirely confidential.

21. What is your gender?
    a. Female
    b. Male

22. What is your ethnic background?
    a. Hispanic
    b. African/American
    c. Caucasian
    d. Asian
    e. American Indian
    f. Other (please indicate) _____

Please turn to page 7 ⟶

23. In what year were you born? _____

24. In what state do you currently reside? _____

25. Please circle the highest level of education that you have completed (Please circle only one):
    a. Elementary school
    b. Some high school
    c. Completed high school
    d. Some college
    e. Completed junior college
    f. Completed a 4-year university
    g. Graduate school
    h. Any other education (please list)_____

26. Including yourself, how many adults (18 yrs+) are living within your household?_____

27. Do you have children living in your household?
    a. Yes
    b. No

    If yes, how many children (age 18 and under) are living in your household? _____

28. What is your current employment status outside of the home? (Please circle only one)
    a. Student
    b. Full-time
    c. Part-time
    d. Not employed

29. Which of the following ranges describes your annual household income before taxes? (Please circle only one)
    a. Under $20,000
    b. $20,000 to $24,999
    c. $25,000 to $29,999
    d. $30,000 to $34,999
    e. $35,000 to $39,999
    f. $40,000 to $49,999
    g. $50,000 to $59,999
    h. $60,000 to $69,999
    i. $70,000 or more

30. What is your current marital status? (Please circle only one)
    a. Married
    b. Single
    c. Divorced
    d. Domestic Partnership
    e. Widowed

31. What is the primary driver of your shopping decisions?
    a. Price
    b. Quality
    c. Health
    d. Other (please describe) _____

Thank you for your time!

In order to have your opinion heard, please return completed surveys in the enclosed postage paid envelope **<u>As Soon As Possible</u>.**

Questions and comments may be addressed to: Wendy Umberger, Assistant Professor
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